CHARACTERIZATION OF *COLLETOTRICHUM LINDEMUTHIANUM* ISOLATES FROM MATO GROSSO STATE, BRAZIL

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INTRODUCTION

Anthracnose is one of the most widespread and economically important common bean diseases (Pastor-Corrales, 2005). This disease, caused by the fungus *Colletotrichum lindemuthianum*, is particularly important in sub-tropical and temperate bean production regions (Pastor-Corrales and Tu, 1994). Favorable environmental conditions for bean anthracnose development, such as moderate to cool temperature (between about 15° to 25° C with an optimum of 17°C), high humidity (greater than 90%), gathered to the presence of susceptible bean varieties and the occurrence of early infections, often result in severe anthracnose symptoms, severe reduction in pod and seed quality and yield losses.

Genetic resistance is the most effective, easy to use, and environmentally-friendly common bean anthracnose management strategy (Pastor-Corrales and Tu, 1994; Kelly and Vallejo, 2004). However, the implementation of resistance is challenged by the recurrent appearance of new virulence phenotypes, usually referred as races, of *C. lindemuthianum*. The repeated appearance of new races has resulted in failures of previously anthracnose-resistant commercial varieties (Kelly et al., 1994; Mahuku et al., 2002). Since 1966, several studies have reported the presence of different races of *C. lindemuthianum* in Brazil and approximately 50 races have been characterized (Alzate-Marin and Sartorato, 2004).

The region of Central Brazil have relevant importance in national bean production and the occurrence of anthracnose could represent great a grain yield threat. Therefore, this study was conducted with the objective of characterizing *C. lindemuthianum* isolates from Mato Grosso State by using differential cultivars.

MATERIALS AND METHODS

In 2008 it was observed that several bean commercial cultivars (*Phaseolus vulgaris* L.) were infected by this pathogen in the common bean production field in Primavera do Leste, Mato Grosso state, Brazil. A total of 33 samples of *C. lindemuthianum* were collected on leaves or pods and 10 of them were evaluated.

To distinguish the races derived from different *C. lindemuthianum* isolates, the differential cultivars set was used. This set consisted on 12 cultivars, each with a designated binary number as following: Michelite, 1; Michigan Dark Red Kidney, 2; Perry Marrow, 4; Cornell 49-242, 8; Widusa, 16; Kaboon, 32; Mexico 222, 64 ; PI 207262, 128; To, 256; Tu, 512; AB 136, 1024; and G 2333, 2048. The sum of the numbers assigned to each infected cultivar of the differential set determined the number or race designation. Cultures from each sample of *C. lindemuthianum* were transferred to petri dishes containing either Mathur's PDA (potato-dextrose agar) or bean pod agar culture medium.

After inoculation, plants were maintained at >95% relative humidity at 21-23°C and 16-h day length (light intensity of 300 micromoles m^{-2} s^{-1} at 1 m height) in a mist chamber for 2 days. After this period, the plants were removed from the mist chamber and transferred to benches in a greenhouse with suitable environment at 22°C with artificial light (12-h day length at 25°C) for seven

days. Anthracnose disease reactions were rated visually using a scale from 1 to 9 (Pastor-Corrales et al., 1995).

RESULTS AND DISCUSSION

The characterization of isolates on the differential cultivars set permitted the identification of two races, both had not been reported previously in Mato Grosso. This is the first occurrence report of races 65 and 81 of *Colletotrichum lindemuthianum* in Mato Grosso. All isolates were compatible to the cultivars Michelite and Mexico 222. Isolates analyzed showed a tendency to infect the Mesoamerican cultivars. Most of the races identified in Paraná and Santa Catarina States have overcome *Co-2*, *Co-3* and *Co-11* genes present in Cornell 49-242, Mexico 222, and Michelite respectively. The races 65 and 81, identified in Mato Grosso, were more frequent and widely distributed in Brazil mainly in Goiás, Santa Catarina, Paraná and Distrito Federal states (Thomazella et al. 2002; Alzate-Marin and Sartorato, 2004; Silva et al., 2007; Gonçalves-Vidigal et al. 2008).

These results are particularly relevant to bean breeding programs that wish to monitor and control the spread of this particular disease through the use of anthracnose resistant cultivars. In this case, to better control the races 65 and 81 of anthracnose the *Co-1*^{2}, *Co-12*, and *Co-13* genes (Andean origin), respectively, present in Kaboon, Jalo Vermelho, Jalo Listras Pretas cultivars, may be used to develop anthracnose resistant bean cultivar by the combination with Mesoamerican origin genes in PI 207262, To, AB 136, and G 2333 cultivars.

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